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Mosquito Larval Control

By

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Mosquito Control 101

Introduction

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Jurassic Period

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Death and Sickness

Mosquito-Borne Diseases (WHO)

- Malaria
- Dengue
- Yellow Fever
- Rift Valley Fever
- Filariasis (Elephantiasis)
- Dog Heartworm
- California Serogroup Viruses
- Eastern Equine Encephalitis
- St. Louis Encephalitis
- Western Equine Encephalitis
- West Nile Virus
- Venezuelan Equine Encephalitis
- Japanese Encephalitis

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Elephantiasis of the legs due to filariasis (CDC).

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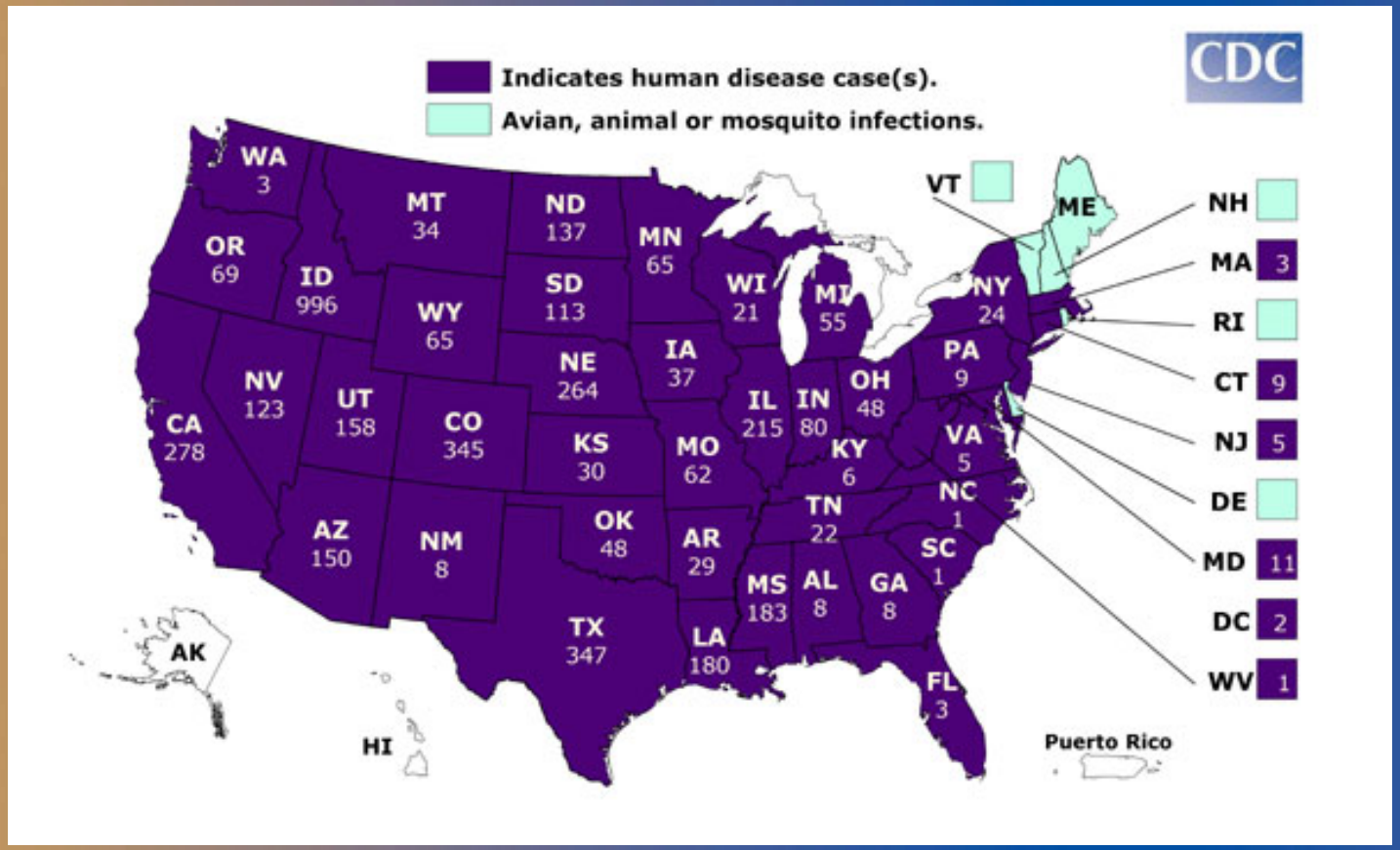
2006 West Nile Virus Activity in the United States (Reported to CDC as of April 3, 2007*)



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Why do we need mosquito control?

Reduce mosquito annoyance

Reduce disease transmission

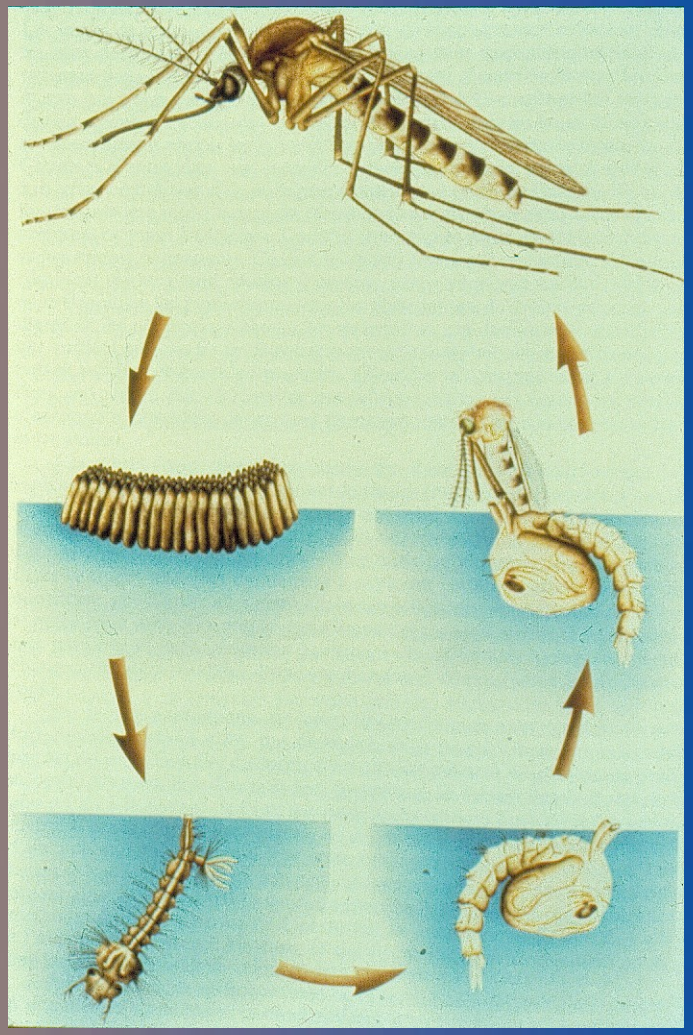
Why Larval Control?

- Treat Less Acreage Compared to Adulticiding
- Better Control Compared to Adulticiding
- Decreased Disease Risk to the Public
- Better Public Perception
- Less Environmental Factors to affect Treatments

Larval Control

- Biology
- Locating Sources
- Pest Collection
- Identification
- Treatment Criteria
- Pesticides
- Formulations
- Equipment
- Source Reduction/Source Enhancement
- Natural Predators
- Record Keeping and Pesticide Reporting

Biology



Adult

Eggs

Pupa

Larva

Biology

Factor	Floodwater	Permanent
Overwintering stage	Egg	Mated females
Population Peaks	At each brood	Gradual build-up
Principle Genera	Aedes, Ochlerotatus, Psorophora	Culex, Culiseta, Anopheles

Biology

Factor	Floodwater	Permanent
Egg Location	Damp soil	Water
Egg Shell	Thick	Thin
Egg Dormancy	Yes	No
Hatching Latency	Yes	No

Locate Sources

- Private Property/Public Property
- Ponds, Lakes
- Fresh Water Marshes
- Ditches, Creeks, Rivers
- Storm Drains, Gutters
- Irrigated Crops
- Artificial Containers, pools, ornamental ponds, urns, septic tanks

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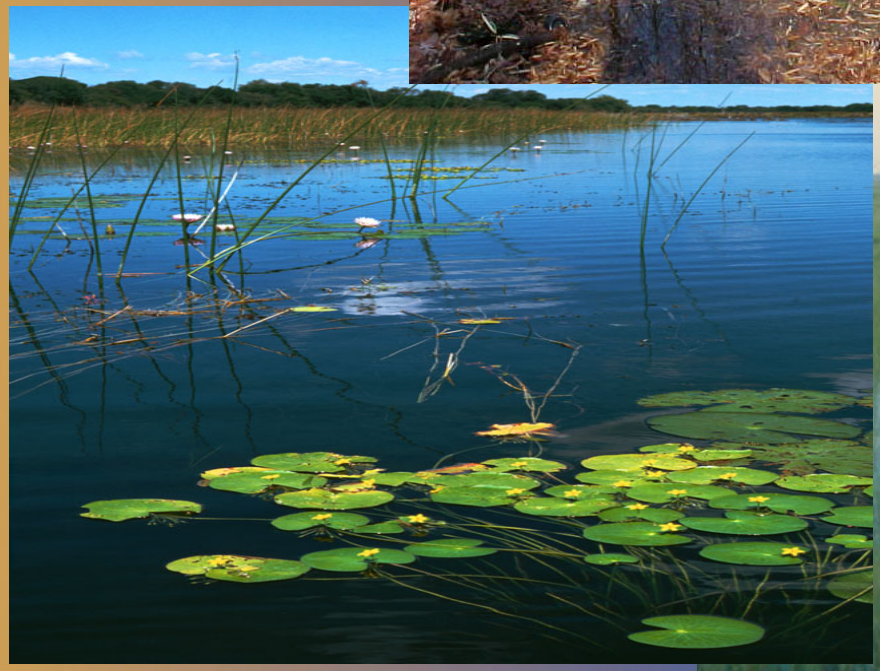
Locate Sources



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Locate Sources

Mosquito Collection

- Larval Collection (dipper)
- Adult Collection (light traps, CO2 traps, Faye traps, Mosquito Magnets, On-Site Collection)

Identification

What Does Identification Tell You?

- Disease Carrier
- Nuisance Biter
- Source type the mosquito came from
- How far the mosquito can travel

Identification

- Egg
- Larva
- Adult

Eggs

Floodwater eggs

Standing water eggs

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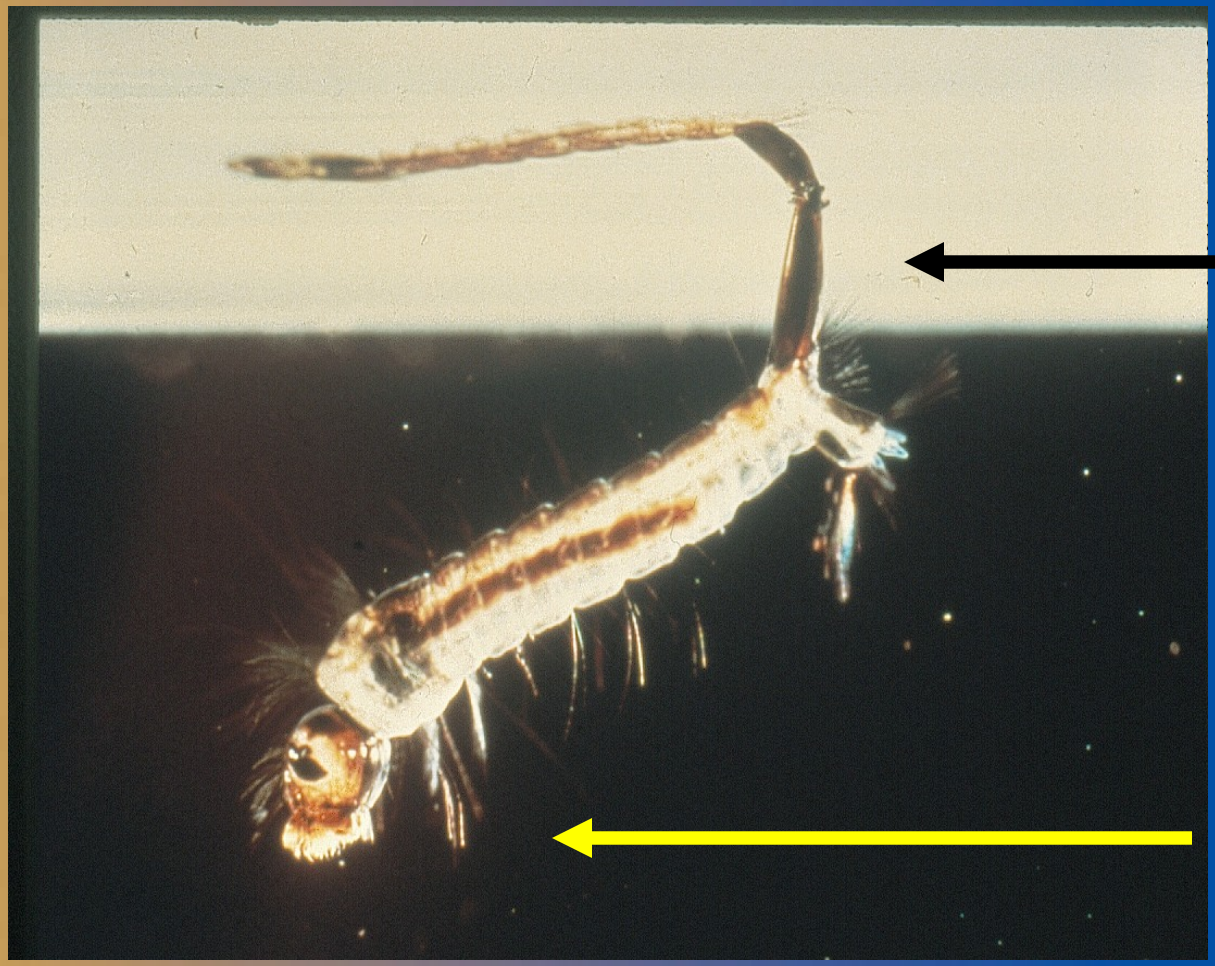
Larva



Adults

Adults

Aedes vexans

Treatment Criteria

- **Treatment Criteria**
  - **Number of larva per dip**
  - **Proximity to populated areas**
  - **Tolerance of Residents**
  - **Species**
  - **Disease Potential**

Larvicides

- **Choose the right larvicide**
  - **For the site**
  - **For the mosquito species or larval stage**
  - **For the equipment**

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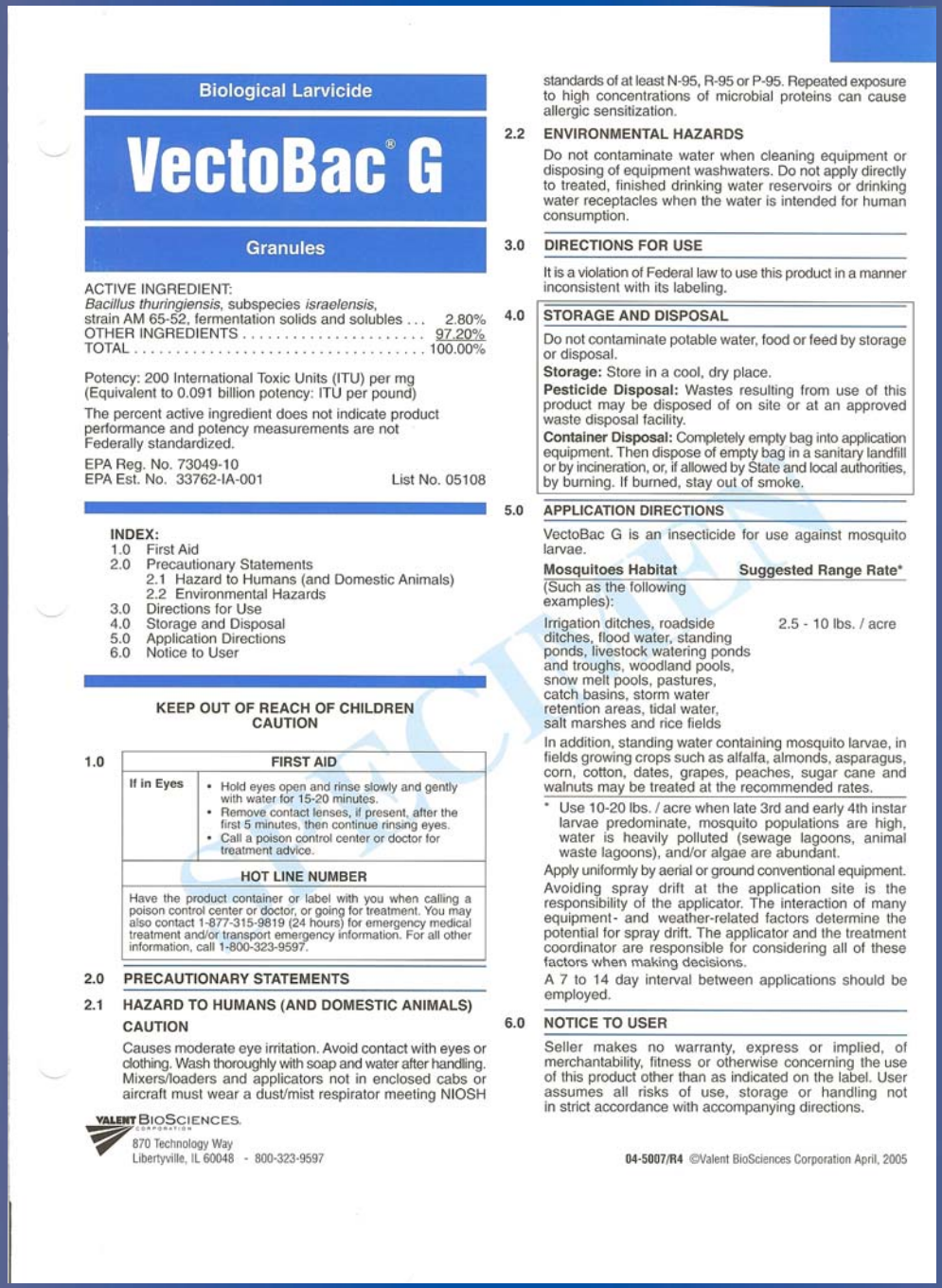
Know Your Label

- Habitat Site
- Application Rate
- Larval Stage or Species
- Environmental Hazards
- Safety Precautions



Biological Larvicide

VectoBac® G

Granules

ACTIVE INGREDIENT:
Bacillus thuringiensis, subspecies *israelensis*,
strain AM 65-52, fermentation solids and solubles ... 2.80%
OTHER INGREDIENTS 97.20%
TOTAL 100.00%

Potency: 200 International Toxic Units (ITU) per mg
(Equivalent to 0.091 billion potency: ITU per pound)

The percent active ingredient does not indicate product performance and potency measurements are not Federally standardized.

EPA Reg. No. 73049-10
EPA Est. No. 33762-IA-001 List No. 05108

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1.0 First Aid
2.0 Precautionary Statements
2.1 Hazard to Humans (and Domestic Animals)
2.2 Environmental Hazards
3.0 Directions for Use
4.0 Storage and Disposal
5.0 Application Directions
6.0 Notice to User

KEEP OUT OF REACH OF CHILDREN
CAUTION

1.0 FIRST AID

If in Eyes	• Hold eyes open and rinse slowly and gently with water for 15-20 minutes. • Remove contact lenses, if present, after the first 5 minutes, then continue rinsing eyes. • Call a poison control center or doctor for treatment advice.

HOT LINE NUMBER

Have the product container or label with you when calling a poison control center or doctor, or going for treatment. You may also contact 1-877-315-9819 (24 hours) for emergency medical treatment and/or transport emergency information. For all other information, call 1-800-323-9597.

2.0 PRECAUTIONARY STATEMENTS

2.1 HAZARD TO HUMANS (AND DOMESTIC ANIMALS)

CAUTION

Causes moderate eye irritation. Avoid contact with eyes or clothing. Wash thoroughly with soap and water after handling. Mixers/loaders and applicators not in enclosed cabs or aircraft must wear a dust/mist respirator meeting NIOSH standards of at least N-95, R-95 or P-95. Repeated exposure to high concentrations of microbial proteins can cause allergic sensitization.

2.2 ENVIRONMENTAL HAZARDS

Do not contaminate water when cleaning equipment or disposing of equipment washwaters. Do not apply directly to treated, finished drinking water reservoirs or drinking water receptacles when the water is intended for human consumption.

3.0 DIRECTIONS FOR USE

It is a violation of Federal law to use this product in a manner inconsistent with its labeling.

4.0 STORAGE AND DISPOSAL

Do not contaminate potable water, food or feed by storage or disposal.

Storage: Store in a cool, dry place.

Pesticide Disposal: Wastes resulting from use of this product may be disposed of on site or at an approved waste disposal facility.

Container Disposal: Completely empty bag into application equipment. Then dispose of empty bag in a sanitary landfill or by incineration, or, if allowed by State and local authorities, by burning. If burned, stay out of smoke.

5.0 APPLICATION DIRECTIONS

VectoBac G is an insecticide for use against mosquito larvae.

Mosquitoes Habitat (Such as the following examples):	Suggested Range Rate*
Irrigation ditches, roadside ditches, flood water, standing ponds, livestock watering ponds and troughs, woodland pools, snow melt pools, pastures, catch basins, storm water retention areas, tidal water, salt marshes and rice fields	2.5 - 10 lbs. / acre

In addition, standing water containing mosquito larvae, in fields growing crops such as alfalfa, almonds, asparagus, corn, cotton, dates, grapes, peaches, sugar cane and walnuts may be treated at the recommended rates.

* Use 10-20 lbs. / acre when late 3rd and early 4th instar larvae predominate, mosquito populations are high, water is heavily polluted (sewage lagoons, animal waste lagoons), and/or algae are abundant.

Apply uniformly by aerial or ground conventional equipment.

Avoiding spray drift at the application site is the responsibility of the applicator. The interaction of many equipment- and weather-related factors determine the potential for spray drift. The applicator and the treatment coordinator are responsible for considering all of these factors when making decisions.

A 7 to 14 day interval between applications should be employed.

6.0 NOTICE TO USER

Seller makes no warranty, express or implied, of merchantability, fitness or otherwise concerning the use of this product other than as indicated on the label. User assumes all risks of use, storage or handling not in strict accordance with accompanying directions.

VALENT BIOSCIENCES CORPORATION
870 Technology Way
Libertyville, IL 60048 - 800-323-9597

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Safety Equipment

- Nitrile or Rubber Gloves
- Safety Glasses
- Goggles
- Hat (impermeable)
- Rubber Boots
- Hearing Protection
- Coveralls (impermeable)

Larvicides

- BTI and BS (Vectobac and Vectolex)
- Surface Films (Agnique MMF and BVA 2 Larvicide oil)
- Growth Regulators (Altosid)
- Organophosphates

Bacillus thuringiensis israelensis – BTI – Vectobac

- BTI is one of the most cost effective pesticides per acre
- Single brood larvicide in liquid and granule formulations.
- Briquets provide 30 days control
- Liquid BTI labeled for control of black flys and labeled for control of mosquitoes in streams.
- Not as effective in highly organic water and cold water temperatures
- Can not treat pupa stage with BTI

Bacillus sphaericus – BS Vectolex

- BS is a multi-brood larvicide
- Provides control for approx. 20 days (or more)
- Continuous Standing Water
- WDG labeled for use in streams.
- After initial kill, you may see up to 3rd instar present. If you see 4th instar or pupa it is no longer working.
- Not as effective in cold water temperatures
- Can not treat pupa stage with BS

Surface Films – Agnique MMF

- Agnique MMF removes the surface tension from water causing mosquito larva and pupa to drown.
- Only product labeled for use in drinking water in the U.S.
- Only granule formulation that kills the pupa stage.
- Takes very little Agnique Liquid to kill larva & pupa stages.
- Get up to 20 days control.
- Agnique Liquid Must be misted on.
- Affected by consistent winds.
- Does not spread well through heavy vegetation.
- Adult female mosquitoes will drown when they land on the water.

Larvicide Oils

- Oil causes a surface barrier, keeping the larva and pupa from being able to breath.
- Provides control for approximately 24 hours.
- Spreads better than Agnique MMF liquid in heavy vegetation.
- Has impact on some non-target species and can burn vegetation.
- Unsightly sheen and odor.

Growth Regulators - Altosid

- Altosid mimics the mosquito growth hormone and causes the mosquito larva not to develop into adult mosquitoes.
- Has formulations that can provide single brood control, 20 days control, 30 days control, and up to 150 days control.
- Absorbed through cuticle and also ingested.
- Can not treat pupa stage with Altosid

Organophosphates - Abate

- Organophosphates are a nerve toxin
- Kills mosquitoes and midges
- Limited use
- Toxic to birds, fish, and non-target insects

Larvicide Formulations

- Liquid
- Wetable Powders, Water Dispersible Granules
- Granules
- Water Soluble Packets
- Pellets
- Briquets

Combining Pesticides or Carriers

- ALL with BTI Liquid=Duplex
- ALL with Sand=Altosand
- BTI with BS=Duplex/VectoMax

Resistance

- Not As Likely As Adulticides
- Rotate Pesticides Occasionally

Equipment

- **Choose the right equipment**
  - **For the material being applied**
  - **For the site and size of the job**
- **Be sure the equipment can deliver at the required rate**
- **Calibrate and Maintain Equipment in good working condition**

Application Equipment

- Spray Bottles
- Hand-Can Sprayers or Back Pack Sprayers
- Power Sprayers w/spray wand or boom

Application Equipment

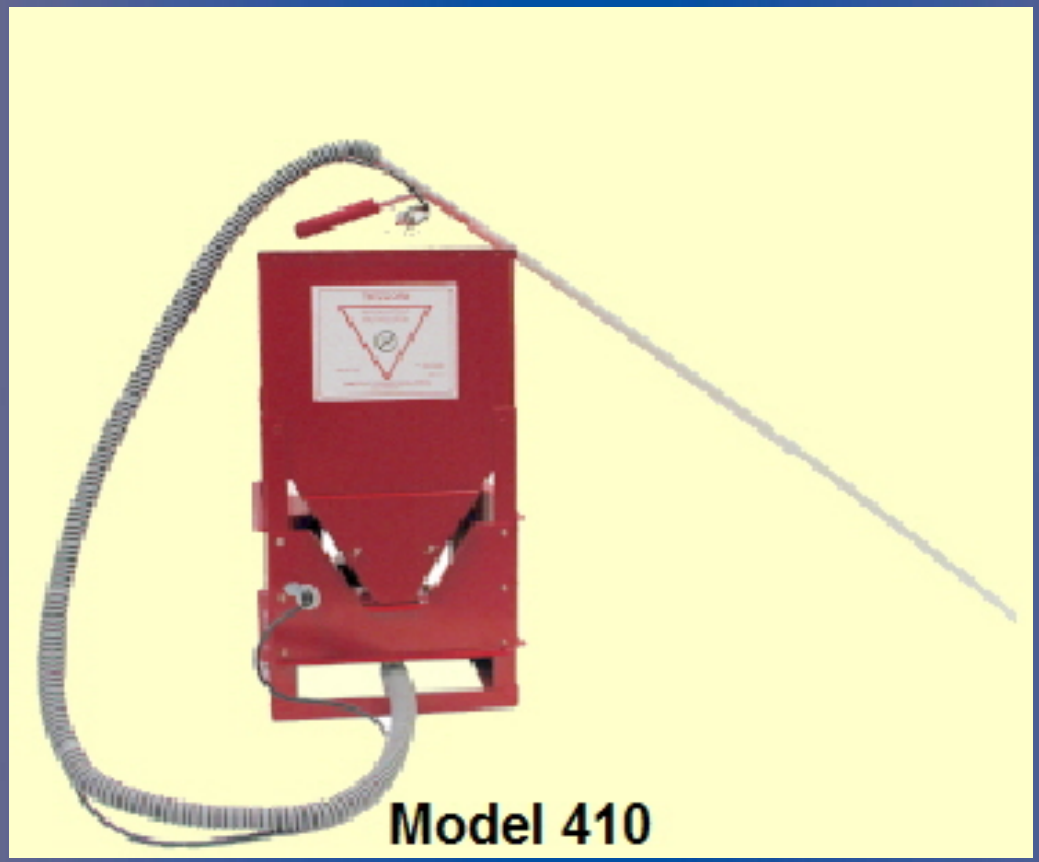
- Power Sprayers (gas or electric) w/spray wand or boom

Application Equipment

- Granule Broadcasters (cyclone style)
- Back Pack Mist-Dusters

Application Equipment

- Arro-gun



Application Equipment

- Mist Blower

Other Equipment

- Pesticide Free

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Aircraft

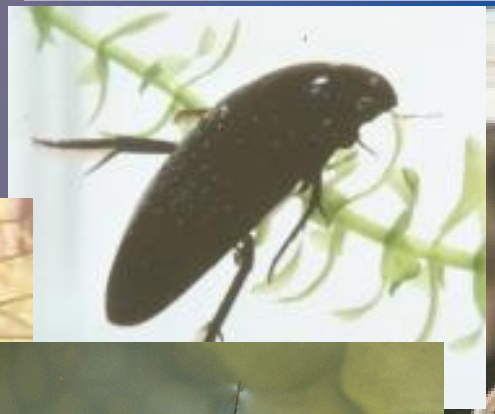
Source Reduction/Source Enhancement

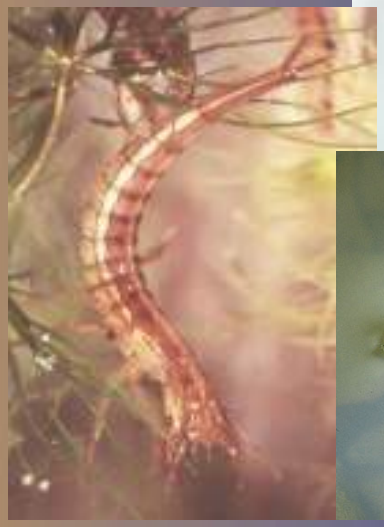
- Artificial containers (tires, Bird Baths, Wheel Barrows, Gutters, Water Barrels, Ornamental Ponds, Pools etc.)
- Agricultural Fields
- Wetlands
- Streams
- Canals or Ditches
- Etc.

Natural Predators

- Fish
- Water Striders
- Back Swimmers
- Dragon Flies
- Water Beetles





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Mosquito Fish

Record Keeping and Pesticide Reporting

- As required by the State of Arizona

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Thank You

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